Search Results To Follow This Sheet

CASE # 10/695,078

US-PAT-NO: 4712641

DOCUMENT-IDENTIFIER: US 4712641 A

TITLE: Method and system for generating shear waves and compression waves in the earth for seismic surveying

DATE-ISSUED: December 15, 1987

US-CL-CURRENT: 181/113, 181/114 , 181/119 , 181/120 , 181/401 , 367/144 , 367/75

US 4,712,641

APPL-NO: 06/653438

DATE FILED: September 21, 1984

PARENT-CASE:

See page 2

RELATED APPLICATION

This application is a continuation-in-part of U.S. application Ser. No. 590,723, filed Mar. 19, 1984 by the inventor herein, now abandoned.

Brief Summary Text - BSTX (2):

Seismic surveying of the earth has been done for a number of years, particularly in the field of petroleum and gas exploration. The original seismic souce was an explosive, such as dynamite or TNT, which was detonated in a bore hole. The compressional seismic waves would be reflected or refracted by geologic structures within the earth. An array of sensitive geophones located at predetermined positions on the surface of the earth at various distances from the bore hole were responsive to the reflected and refracted waves, and the resultant electrical signals from those geophones were recorded and interpreted to yield much useful information.

Brief Summary Text - BSTX (3):

There are many drawbacks in the use of explosives, including safety, cost of drilling bore holes and length of time needed to drill them, cost of explosives themselves and lack of repeatability. If a second and equal-size charge of explosives is detonated in the same bore hole, the resultant seismic waves will be different from the original waves, because the bore hole was distorted by the first explosion. Accordingly, explosives have, in many cases, been supplanted by alternate energy surface sources, such as those employing the "air gun". An air gun suddenly releases a charge of pressurized gas, usually compressed air, with powerful explosive-like abruptness, and this discharge can be predictably repeated time after time after time. Air guns have been incorporated in land seismic energy surface sources, examples being those disclosed and claimed in the following U.S. patents:

Brief Summary Text - BSTX (9):

These land seismic energy surface sources have included a tank, which in the last four of these patents is in the shape of an inverted dome. The tank is provided with a displaceable diaphragm bottom to contain an incompressible liquid such as water. One or more air guns are positioned within the tank and receive and store pressurized air, or other suitable gas, under high pressure supplied from a source such as the receiver chamber or pressure tank of

US 4,712,641

a high pressure air compressor. The last three of these patents show a metal pan positioned between the diaphragm and the earth so that, upon the abrupt release of the high pressure gas from the air gun into the liquid, the flexible diaphragm suddenly thrusts down on the metal pan to suddenly thrust down on the portion of the earth beneath the pan and thereby produce a powerful seismic impulse. One of the aforementioned patents (U.S. Pat. No. 4,316,521) discloses the concept of inclining the entire generating assembly away from the vertical in order to accommodate local variations in the slope of the earth's surface. In each of the land seismic sources shown in these patents the seismic energy which is transmitted into the earth mainly is in the form of compressional (P) waves.

Brief Summary Text - BSTX (15):

In accordance with the present invention, there is provided an apparatus for generating shear SH and compression P waves in the earth for seismic surveying. This apparatus includes a transporter which is movable across the earth's surface and carries a substantially vertical elongated hollow cylinder having closed upper and lower ends. An earth-contacting pad is pivotally mounted to the lower end of the cylinder by a horizontal pivot shaft extending in a direction parallel with the front-to-back centerline of the transport vehicle. This pivot shaft and the mounting on the transporter enable the cylinder to be oriented upright, to be inclined to the left at various angles, and to be inclined to the right at various angles. The lower surface of this large rigid pad contains multiple, blade-like teeth extending parallel with the pivot shaft, for gripping the earth's surface for transmitting powerful horizontally polarized shear stress impulses into the earth. The cylinder contains a slidable piston-like reaction mass. The bottom of the cylinder is a strong upwardly diverging conical surface serving to focus and direct upwardly the discharge blast from each port of an air gun. This air gun extends horizontally, with the axis of the air gun being oriented parallel with the pivot axis and being located a short distance above the pivot shaft. Thus, the cylinder bottom is defined by the intersection of an elongated cylinder in which the air gun is located and a cone. Each air gun port is located near the center of the upwardly facing cone for focusing the blast upwardly toward the reaction mass. A small amount of water below the reaction piston mass and above the conical bottom surrounds the air gun ports and fills the volume between the reaction mass and the conical bottom. The air gun is selectively discharged to forcibly drive the earth-contacting pad down while the reaction mass moves up in the cylinder. By inclining the cylinder to the left of vertical or to the right of vertical while the pad seats on the earth with its parallel blade-like teeth embedded into and gripping the earth's surface, the resulting sudden downward angled thrust is transmitted into the earth to generate horizontally polarized shear (SH) waves in addition to compression (P) waves. The entire assembly is mounted on a transporter, such as a truck or log-skidder from which it may be lowered against the earth's surface as desired. The transporter carries a prime mover, an air compressor and a receiver tank for supplying high pressure air to the air gun, and an air/water separator separating the water from the air after each discharge of the air gun. A seismic survey method includes progressing from shot point to shot point along a seismic survey line, and at each shot point the cylinder is stood upright, is inclined to the left and is inclined to the right, in any desired sequence, and the air gun is fired while the cylinder is oriented in each of these attitudes for generating predetermined sequences and mixtures of compressional (P) waves, left-handed horizontally polarized shear (SH) waves and right-handed horizontally polarized shear (SH) waves, thereby enhancing the ability to employ seismic energy transmitted into the earth from its surface for acquiring information about geological features in the earth.

Detailed Description Text - DETX (23):

Concurrently with the production of the desired force into the earth, the reaction mass 118 is driven upwardly as illustrated in FIGS. 9 and 10. As mass 118 begins its upward travel, it uncovers the holes 70 in the cylinder 20 (FIGS. 2 and 3). This permits the water 160 and expanded air to exit via passages 114 and into manifold chamber 110 and thence through hose 48 into air/water separator 38. Desirably, the holes 70 are positioned near the lower bearing sleeve 120-2 to avoid elevating the reaction mass 118 needlessly. These holes 70 are sufficiently elevated to allow sufficient time for the rise time (approximately 5 milliseconds) of the resultant land source seismic pulse. Any air and water arising within the cylinder 20 above the reaction mass 118 are forced outwardly through the holes 62 in the cover plate 58 and through the check valve formed by ring 64 and housing 66. This air and water exit through the fitting 42 and hose 46 leading to the air/water separator 38. The perforated drum 39 reduces the air velocity to permit entrained water to separate from the

air and drop into the bottom of the separator 38 where it pools and is returned via discharge line 52 to the pump 36. The air is discharged to atmosphere through the vent 50. The reaction mass 118 thereupon returns by gravity to its initial position, and the cycle is ready to be repeated. The check valve 64, 62 closes as soon as the reaction mass 118 starts to slide downwardly in the cylinder, and thus a reduced pressure (suction) is created in the upper end of the cylinder for advantageously slowing the descent of the reaction mass as seen in FIG. 11.

Detailed Description Text - DETX (33):

Returning to further description of the hydraulic lift cylinders 204a and 204b for the seismic energy generator 21, it is noted that the most detailed showing thereof is seen in FIG. 18. The construction of the collar 206 located near the lower end of lift cylinder will be most readily understood from FIG. 18. Such a collar 206 comprises an upper ring 210 which is welded to the cylinder 204. This ring 210 supports, by a plurality of machine screws 212, a bearing housing 214 located at the lower end of the lift cylinder. The inner surface of this housing 214 supports a sleeve bearing 216 which slidably supports a strong, stiff, tubular piston rod 218 of relatively large diameter for resisting bending stresses. A bearing retainer 220 is secured to the bottom of the bearing housing 214 by machine screws 221 and encloses a resilient seal assembly 222 encircling and slidably engaging the piston rod 218 for retaining lubricating oil within the cylinder 204. The outer surface of the bearing housing 214 has an annular saddle recess which retains an external bearing block 224. Opposite facing surfaces of this external bearing block 224 have convex circularly curved profiles, as is clearly shown in FIG. 18.

Detailed Description Text - DETX (42):

As will be most readily understood from FIG. 17, the elbow portion 265 of the L-shaped lever 263 is connected by a pin 267 to the end of bearing assembly 26 in line with the axis of the bearing assembly 26 for holding the vertical reaction arm 270 always parallel with the piston rod 218 of the lift cylinder. Thus, the pivot pin 264 at the lower end of the tilt cylinder piston rod 268 always maintains a predetermined fixed position relative to the seismic energy generator 21, regardless of whether the generator 21 is raised or lowered by the lift cylinders 204. By virtue of the fact that the collars 272 can slide up or down along their respective tubular piston rods 218, the lift cylinders 204 and the transporter vehicle are isolated from much of the mechanical shock occurring during those moments when the seismic energy generator 21 is fired.

Detailed Description Text - DETX (54):

FIGS. 19-21 illustrate three modifications of ground plate assemblies which may be employed in various types of terrain to enhance the coupling between the seismic energy generator 21 and the ground. Plate assembly 30A shown in FIG. 19 includes the disc 144 and teeth 156 previously described but includes, in addition, a sharpened, circular peripheral blade 292 encircling the blades 156. Openings 294 in the disc 144 between the respective blades 156 communicate with a vacuum chamber 296 which is connected by a suction line 298 through a filter 300 to a vacuum pump 302. This vacuum chamber 296 is located in the spaces between the stiffening ribs 146 (FIGS. 2, 3 and 6) and the transverse ribs 148 (FIG. 3). Connected into the suction line 298 is a solenoid-operated vacuum break valve 304 which has a port 305 communicating with the atmosphere, as indicated by the arrow 307. It will be understood that, after forcing the blades 156 and the surrounding peripheral blade 292 down into the earth, a vacuum created in the chamber 296 will serve to enhance the coupling between the plate assembly 30A and the earth.

Claims Text - CLTX (158):

a seismic energy discharge chamber closed by a head portion shaped to direct the discharge of pressurized gas upwardly from an air gun;

Claims Text - CLTX (159):

CASE # 10/695,078

DERWENT-ACC-NO: 1993-075814

DERWENT-WEEK: 199309

TITLE: SH wave generator, e.g. for examining underground structure and ground surveying has fixing device on bottom of driving plate, and hydraulic actuators with reaction masses acting tangentially on plate circumference and reciprocated by plate shear or transverse wave artificial seismic wave

PRIORITY-DATA: 1991US-676418 (March 28, 1991)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
US 5187331 A	February 16, 1993	EN

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
US 5187331A	N/A	1991US-676418	March 28, 1991

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	G01 V 1/153 20060101

Basic Abstract Text - ABTX (1):

The appts. for generating SH waves includes a rigid driving plate (1) with a fixing device (6) provided on the bottom to fix the plate onto a surface of the earth. A number of hydraulic actuators (2) are equidistantly mounted on a circumference of the driving plate, which have reaction masses and act tangentially on a same circumference from a centre of the driving plate (4,5).

Basic Abstract Text - ABTX (2):

A driving device reciprocates the actuators independently of each other parallel to the surface of the earth at a controlled frequency, therein generating transverse waves. Each actuator includes a cylinder and a piston rod extending through it, with the rod mounted at both ends on supports (3) fixed to the driving plate.

Title - TIX (1):

SH wave generator, e.g. for examining underground structure and ground surveying has fixing device on bottom of driving plate, and hydraulic actuators with reaction masses acting tangentially on plate circumference and reciprocated by plate shear or transverse wave artificial seismic wave

EPI Manual Codes - EMCD (1):

S03-C01A;

CASE A 10/695,078

US-PAT-NO: 5187331
DOCUMENT-IDENTIFIER: US 5187331 A
See image for Certificate of Correction
TITLE: SH wave generator

DATE-ISSUED: February 16, 1993

US-CL-CURRENT: 181/121, 181/114 , 367/189 , 367/75

APPL-NO: 07/676418
DATE FILED: March 28, 1991

Abstract Text - ABTX (1):

The SH wave generating apparatus includes a driving plate (1) of increased rigidity; a fixing device (6) provided on the bottom of the driving plate for fixing the driving plate onto the earth's surface; a plurality of hydraulic actuators (2) mounted on the driving plate, which have reaction masses and act tangentially on the same circumference from the center of the driving plate; and a driving device (4,5) for reciprocating the plurality of hydraulic actuators (2) at a controlled frequency, thereby generating transverse waves. The plurality of hydraulic actuators (2) are equidistantly mounted on the driving plate (1), and each include a cylinder (2) and a piston rod extending therethrough. The said piston rod is mounted at both ends on supports (3) fixed to the driving plate (1) and the cylinder acts as a reaction mass. Alternatively, the piston rod extending through the cylinder 2 may be provided at both ends with reaction masses. The plurality of hydraulic actuators (2) are reciprocated synchronously or at controlled phases to generate SH or S waves. Also, the driving plate (1) is provided at its center with a vertical member (11) for applying vertical load through a bearing (7) and a pneumatic spring (8). Connected to a central portion of a motor vehicle, the vertical member (11) is designed to apply vertical load to the present apparatus through hydraulic mechanisms and hold up the present apparatus while on wheels.

Brief Summary Text - BSTX (8):

For earthquake prediction, there is available the so-called vibrosize reflection technique, according to which a strong vibrator with a built-in hydraulic actuator is mounted on a motor vehicle for mobile seismic exploration. In this case, the frequency of the vibrator may be controlled on any desired time scale by a combination of electronics with hydraulic mechanism. For example, this may make is possible to generate the so-called sweep waves whose frequency varies with time. These input waves and the resulting reflected waves are well suited for data processing. With this technique, generally making use of P waves, some experiments have recently been attempted to generate S waves by oscillating the hydraulic actuator in parallel to the earth's surface. In this case, however, SV and P waves occur unavoidably in addition to the SH waves.

Brief Summary Text - BSTX (14):

a plurality of hydraulic actuators mounted on the driving plate, which have reaction masses and act tangentially on the same circumference from the center of the driving plate, and

21/5,K/5 (Item 1 from file: 987) Links
TULSA (Petroleum Abs)

0001126418 **Petroleum Abstract No:** 771836
DIPOLE LOGGING TOOL

Author (Inventor): HOYLE, D; TASHIRO, H
Patent Assignee: SCHLUMBERGER LTD; SCHLUMBERGER TECHNOL BV; SCHLUMBERGER SURENCO SA; PETROLEUM RES & DEVELOP NV; SCHLUMBERGER CANADA LTD; SCHLUMBERGER OVERSEAS SA; SCHLUMBERGER SERV PETROL; SCHLUMBERGER HOLDINGS LTD
Patent Information: World 01/73,478A2, p. 10/4/2001, f. 3/21/2001, pr. U.S. 3/29/2000 (Appl. 537,836) (G01V-001/52). (19 pp; 19 claims)
Patent (Number Kind, Date): WO 01/73478 A2, 20011004
Application (Number, Date): WO, 20010321
Priority (Number, Date): US 537836, 20000329
2001
Publication Year: 2001
IPC Code: G01V-001/52
Language: ENGLISH
Document Type: PATENT; P
Record Type: ABSTRACT
A logging tool is described that has a tool body which can be positioned in a fluid-filled **borehole**. The tool includes a receiver section and a dipole transmitter, wherein the dipole transmitter includes a transducer with a shell having a **reaction mass** and a **motor** located therein. The motor operatively connects the shell and the reaction mass such that only an outer surface of the shell is in contact with the fluid in the **borehole**. This new type of dipole source for **well** logging involves shaking all or part (axially) of a dipole tool body to produce a pure, broadband **acoustic** dipole **signal** while at the same time coupling as little energy as possible into the tool body. Important variations on this idea include a linear phased array of shaker sources and active cancellation of tool-borne **noise**.
Primary Descriptor: SONIC LOGGING
Major Descriptors: **ACOUSTIC** RECEIVER; DIPOLE; **ELASTIC WAVE** LOGGING; ELECTRICAL EQUIPMENT; ELECTRONIC EQUIPMENT; RECEIVER (ELECTRONIC); SPRING (MECHANICAL); TRANSMITTER; **VIBRATOR**; **WELL LOGGING**
Minor Descriptors: (P) WORLD; **ACOUSTICS**; ALIGNMENT; CASINGS; CHART; DETECTION; DETECTOR; DIAGRAM; **ELASTIC WAVE**; ELECTRIC MOTOR; ENGINEERING DRAWING; ENGLISH; FORMATION EVALUATION; FREQUENCY; INSTRUMENT; INTERPRETATION; MOTOR; MOUNTING; NATURAL FREQUENCY; **NOISE** REDUCTION; ORIENTATION; OSCILLATING; PATENT; PETROLEUM RES & DEVELOP NV; POLARIZATION; PRIME MOVER; REMOTE SENSING; REMOTE SENSOR; RESONANCE; SCHLUMBERGER CANADA LTD; SCHLUMBERGER HOLDINGS LTD; SCHLUMBERGER LTD; SCHLUMBERGER OVERSEAS SA; SCHLUMBERGER SERV PETROL; SCHLUMBERGER SURENCO SA; SCHLUMBERGER TECHNOL BV; SONDE; SOUND WAVE; SOUND WAVE SOURCE; **VIBRATION**; WAVE; WAVE SOURCE; WEIGHT; **WELL** LOGGING & SURVEYING; **WELL** LOGGING EQUIPMENT
Subject Heading: **WELL** LOGGING & SURVEYING

L7 ANSWER 2 OF 6 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1989-076524 [10] WPIX
CR 1987-277738
DNC C1989-034067 [21]
DNN N1989-058374 [21]
TI Non-destructive downhole seismic vibrator source using reaction mass - for determining information about surrounding geological formation performing cross-well tomography and reverse vertical seismic profiling
DC H01; S03; X25
IN PAULSSON B N P
PA (CALI-C) CHEVRON RES CO
CYC 1
PIA US 4805725 A 19890221 (198910)* EN 15[14]
ADT US 4805725 A US 1986-841074 19860318; US 4805725 A US 1987-95291 19870910
PRAI US 1987-95291 19870910
AB US 4805725 A UPAB: 20050427
Non-destructive hydraulic downhole seismic sources and processes of obtaining information about underground formations penetrated by at well bore(s), in which the downhole seismic source comprises (a) a housing; (b) means for clamping the housing in a well bore; (c) a reaction mass in the housing, the reaction mass oriented to move perpendicularly to the well bore axis; (d) means for hydraulically moving the reaction mass such that forces are transmitted through the clamp and into the well bore to generate detectable seismic wave(s) of predetermined frequency to the housing; and (e) means for rotating the reaction mass around an axis parallel to the well bore axis to orientate the mass in a selected direction.

ADVANTAGE - Seismic source can achieve non-destructive output forces of up to 18,000 newtons at frequencies of up to 500 Hz or higher from a reaction mass of only about 300 lbs. This power and frequency capability is in orders of magnitude greater than previously available from downhole vibratory sources e.g.air driven vibrators or vibrating packers, whilst providing tomographic reservoir images without the attenuation and filtering of the higher frequencies by the weathering layer when using surface data gathering sources.

21/5,K/4 (Item 1 from file: 103) **Links**
Energy SciTec

02330075 NOV-89-055001; EDB-89-075836
Author(s): Paulsson, B.N.P.
Title: **Nondestructive downhole seismic vibrator source and processes of utilizing the vibrator to obtain information about geologic formations**
Patent No.: US 4805725
Patent Assignee(s): Chevron Research Co., San Francisco, CA
Patent Date Filed: Filed date 10 Sep 1987

Publication Date: 21 Feb 1989 p v
Document Type: Patent
Language: English
Journal Announcement: ETD8900
Availability: Patent and Trademark Office, Box 9, Washington, DC 20232.
Subfile: ETD (Energy Technology Data Exchange) . NOV (DOE contractor)
Country of Origin: United States
Country of Publication: United States
Abstract: A **downhole** seismic source is described comprising: a housing; means for clamping the housing in a **well bore**; a reaction mass in the housing, the **reaction mass** oriented to **move** generally perpendicular to the **well bore** axis; means for hydraulically **moving** the **reaction mass** such that forces are transmitted through, through the clamp and into the **well bore** to generate at least one detectable seismic wave of predetermined frequencies to the housing; and means for rotating the reaction mass around an axis generally parallel to the **well bore** axis so as to orientate the mass in a selected direction.
Major Descriptors: *SEISMIC DETECTORS -- DESIGN
Descriptors: CONTAINERS; EXPLORATION; FASTENERS; HYDRAULICS; NATURAL GAS DEPOSITS; OPERATION; PETROLEUM DEPOSITS; ROTATION; SEISMIC SURVEYS; SEISMIC WAVES
Broader Terms: FLUID MECHANICS; GEOLOGIC DEPOSITS; GEOPHYSICAL SURVEYS; MEASURING INSTRUMENTS; MECHANICS; MINERAL RESOURCES; MOTION; RESOURCES; SEISMIC ARRAYS; SURVEYS
Subject Categories: 020200* -- Petroleum -- Reserves, Geology, & Exploration
030200 -- Natural Gas -- Reserves, Geology, & Exploration

CASE # 10/695,078

DERWENT-ACC-NO: 1989-076524

DERWENT-WEEK: 198910

TITLE: Non-destructive downhole seismic vibrator source using reaction mass for determining information about surrounding geological formation performing cross-well tomography and reverse vertical seismic profiling

PRIORITY-DATA: 1987US-095291 (September 10, 1987)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
US 4805725 A	February 21, 1989	EN

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
US 4805725A	N/A	1987US-095291	September 10, 1987

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	G01 V 1/145 20060101
CIPS	G01 V 1/42 20060101
CIPS	G01 V 11/00 20060101

RELATED-ACC-NO: 1987-277738

Basic Abstract Text - ABTX (1):

Non-destructive hydraulic downhole seismic sources and processes of obtaining information about underground formations penetrated by at well bore(s), in which the downhole seismic source comprises (a) a housing; (b) means for clamping the housing in a well bore; (c) a reaction mass in the housing, the reaction mass oriented to move perpendicularly to the well bore axis; (d) means for hydraulically moving the reaction mass such that forces are transmitted through the clamp and into the well bore to generate detectable seismic wave(s) of predetermined frequency to the housing; and (e) means for rotating the reaction mass around an axis parallel to the well bore axis to orientate the mass in a selected direction.

Basic Abstract Text - ABTX (2):

ADVANTAGE - Seismic source can achieve non-destructive output forces of up to 18,000 newtons at frequencies of up to 500 Hz or higher from a reaction mass of only about 300 lbs. This power and frequency capability is in orders of magnitude greater than previously available from downhole vibratory sources e.g.air driven vibrators or vibrating packers, whilst providing tomographic reservoir images without the attenuation and filtering of the higher frequencies by the weathering layer when using surface data gathering sources.

Title - TIX (1):

L7 ANSWER 1 OF 6 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1991-065021 [09] WPIX
DNC C1991-027554 [21]
DNN N1991-050320 [21]
TI Downhole seismic source for generating seismic signals - can be located in various positions including contacting bottom of well bore and has vibratory piston
DC H01; S03; X25
IN AIRHART T P
PA (ATLF-C) ATLANTIC RICHFIELD CO
CYC 1
PIA US 4991685 A 19910212 (199109)* EN
ADT US 4991685 A US 1989-415618 19891002
PRAI US 1989-415618 19891002
AB US 4991685 A UPAB: 20050430

Downhole seismic source for generating seismic signals that is located in a wellbore, comprises (a) an elongate hollow body arranged to be lowered into a well bore; (b) signal generating means in the body operably having a lower portion located at the distal end of the body so that, when lowered into the well bore, the lower portion is in contact with a medium into which the seismic signals are to be transmitted; and (c) control means in the body for activating the signal generator to create the seismic signals in the medium with the lower portion.

ADVANTAGE - Both the vibratory and the impact types of downhole seismic generator will efficiently anc consistently generate seismic signals as required and can be used to generate such signals in different locations in the well bore.

Member(0001)
ABEN UPAA 20050430

A downhole seismic generator that can be located in various positions in the well including being located in engagement with the bottom of the well bore and that includes a large striker mass driven by compressed gas into engagement with an anvil having one end located in engagement with the medium in which the seismic signals are to be set up. Retractor means is provided to return the mass to the ready position so that a series of seismic signals can be provided as desired. Optional baffle means connected to the generator prevent waves from traveling through the well bore which would otherwise diminish or confuse the seismic shock wave initially generated. A downhole seismic generator that can be located in various positions in the well including being located in engagement with the bottom of the well bore that includes a vibrator piston located in a reaction mass and driven by a hydraulic system to cause reciprocation of the piston to set up vibrations in the medium to which the lower end of the piston is exposed.

21/5,K/1 (Item 1 from file: 23) **Links**
CSA TECHNOLOGY RESEARCH DATABASE

0010300633 IP Accession No: 200809-71-1677532; 200809-26-0081866; 200809-61-1779752; 20081630432; A08-99-1734043; 20080010888
Downhole seismic source

Airhart, Tom P
, USA
Publisher Url: http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&u=/netaht ml/PTO/search-adv.htm&r=1&p=1&f=G&l=50&d=PTXT&S1=4991685.PN.&OS=pn/4991685& RS=**PN/4991685**

Document Type: Patent
Record Type: Abstract
Language: English
File Segment: Metadex; Civil Engineering Abstracts; Mechanical & Transportation Engineering Abstracts; ANTE: Abstracts in New Technologies and Engineering; Aerospace & High Technology; Earthquake Engineering Abstracts

Abstract:
A **downhole** seismic generator that can be located in various positions in the **well** including being located in engagement with the bottom of the **well bore** and that includes a large striker mass driven by compressed gas into engagement with an anvil having one end located in engagement with the medium in which the seismic **signals** are to be set up. Retractor means is provided to return the mass to the ready position so that a series of seismic **signals** can be provided as desired. Optional baffle means connected to the generator prevent waves from traveling through the **well bore** which would otherwise diminish or confuse the seismic shock wave initially generated. A **downhole** seismic generator that can be located in various positions in the **well** including being located in engagement with the bottom of the **well bore** that includes a **vibrator** piston located in a **reaction mass** and **driven** by a hydraulic system to cause reciprocation of the piston to set up **vibrations** in the medium to which the lower end of the piston is exposed.

Descriptors: Seismic phenomena; Seismic engineering; Pistons; Generators; **Vibration**; Reciprocation; **Vibrators**; Baffles; Compressed gas; Hydraulic systems; Anvils; Shock waves; Exposure
Subj Catg: 71, General and Nonclassified; 26, Seismic Engineering; 61, Design Principles; 99, General

CASE # 10/695,078

United States Patent [19]

Myers

[11] Patent Number: 4,785,431

[45] Date of Patent: Nov. 15, 1988

[54] BROAD-BAND HYDRAULIC VIBRATOR

[75] Inventor: Wilbur J. Myers, Davis, Okla.

[73] Assignee: Conoco Inc., Ponca City, Okla.

[21] Appl. No.: 66,390

[22] Filed: Jun. 25, 1987

[51] Int. Cl.[4] H04R 23/00

[52] U.S. Cl. 367/189; 367/190; 181/121; 92/13.51

[58] Field of Search 367/189, 190; 181/106, 181/108, 113, 114, 119, 121; 92/13.1, 13.51, 13.8

[56] References Cited

U.S. PATENT DOCUMENTS

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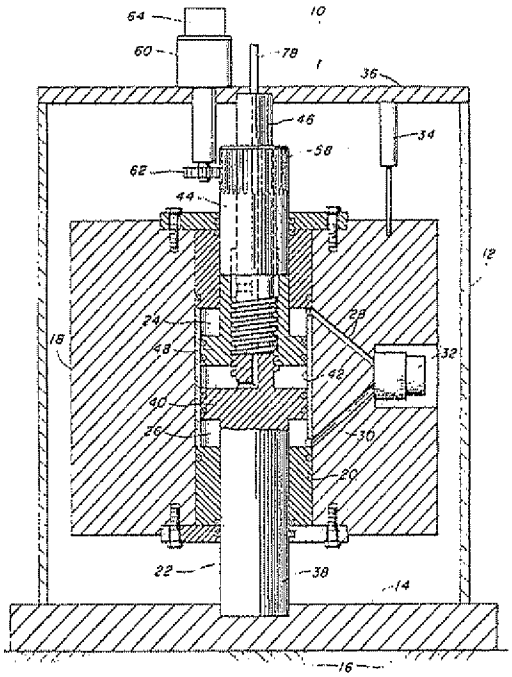
4,388,981	6/1983	Fair	181/119
4,450,298	5/1984	Weber et al.	181/121
4,641,725	2/1987	Cole et al.	181/119

Primary Examiner—Charles T. Jordan
Assistant Examiner—John W. Eldred
Attorney, Agent, or Firm—Ronald J. Carlson; Cortlan R. Schupbach; Frank J. Kowalski

[57] ABSTRACT

A hydraulic vibrator having an adjustable piston rod and a fixed piston rod to vary the cylinder volume for operation at different vibration frequencies. The adjustable piston rod is in threaded engagement with the fixed piston rod and has a piston head adjacent a piston head on the fixed piston rod. Rotation of the adjustable piston rod displaces the two piston heads, thereby varying the cylinder volume of the hydraulic vibrator.

10 Claims, 2 Drawing Sheets



L7 ANSWER 4 OF 6 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1988-229096 [33] WPIX
TI Omnidirectional seismic shear wave **vibrator** with telescopic tube - imparts elliptically-polarised **vibrations** to **earth** from vehicle-mounted reaction masses driven by hydraulic actuators
DC S03
IN COLE J; COLE J H
PA (CONO-C) CONOCO INC
CYC 6
PIA EP 278152 A 19880817 (198833)* EN 16[14]
NO 8800426 A 19880829 (198840) NO
CN 87105735 A 19880817 (198932) ZH
US 4871045 A 19891003 (198949) EN 15
EP 278152 B 19920304 (199210) EN
DE 3777155 G 19920409 (199216) DE
ADT EP 278152 A EP 1987-306947 19870805; US 4871045 A US 1987-9989 19870202
PRAI US 1987-9989 19870202
AB EP 278152 A UPAB: 20050429
The **vibrator** includes a quadrature array of guide rods (28,41) forming a vertically positionable frame for mounting on a vehicle with jack assemblies (20,24) and the telescopic tube (16), to which shear wave energy is imparted from a lower **reaction mass** (32) as the tube is **driven** into the earth with elliptically polarised **vibrations**. An upper passive reaction mass (72) is positioned laterally by air mounts (84,86) on brackets (88,90) The conical head (108) with a semi-vertical angle of about 25 deg. has a quadrature array of blades (110) to enhance earth engagement as the inner tube (106) moves within the outer pivot tube (104) in bronze bearings (112,114).
USE/ADVANTAGE - For geophysical prospecting in soft surface earth, marsh of inundated areas. Efficiency is improved with less hold-donw force required for same energy-coupling capability.
Member(0004)
ABEQ US 4871045 . . . position while the energy-coupling telescoping tube is extendably forced into an earth medium so that, during shear wave generation, the **vibration** source or reaction mass is continually imparting shear wave energy into the progressively extending telescoping tube to effect continual energy coupling into the surrounding earth medium. The **reaction mass** is **driven** by a hydraulic actuator system that imparts elliptically polarised **vibration** to the telescopic tube which, in turn, imparts elliptically polarised shear waves into the surrounding earth medium.
USE/ADVANTAGE - Marshland and submarine. - Simultaneously generates compressional and elliptically polarised shear wave **signals** and has a more versatile seismic shear wave source. (15pp) 3777155 G UPAB 20050429
The **vibrator** includes a quadrature array of guide rods (28,41) forming a vertically postionable frame for mounting on a vehicle with jack assemblies (20,24) and the telescopic tube (16), to which shear wave energy is imparted from a lower **reaction mass** (32) the tube is **driven** into the earth with elliptically polarised **vibrations**. An upper passive reaction mass (72) is positioned laterally by air mounts (84,86) on brackets (88,90) The conical head (108). . .

L7 ANSWER 5 OF 6 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1987-277738 [39] WPIX
CR 1989-076524
DNC C1987-118013 [21]
DNN N1987-208189 [21]
TI Non-destructive downhole seismic vibrator source - for performing cross-well tomography and reverse vertical seismic profiling
DC H01; S03
IN PAULSSON B; PAULSSON B N P
PA (CALI-C) CHEVRON RES CO
CYC 10
PIA WO 8705708 A 19870924 (198739)* EN 35[13]
US 4702343 A 19871027 (198745) EN 15
AU 8772056 A 19871009 (198751) EN
NO 8704609 A 19871221 (198805) NO
BR 8706213 A 19880223 (198813) PT
EP 263149 A 19880413 (198815) EN
CN 87101987 A 19871007 (198844) ZH
US 4783771 A 19881108 (198847) EN 15
JP 63503326 W 19881202 (198903) JA
AB WO 1987005708 A UPAB: 20050425
A downhole seismic source comprises a housing, a clamping device to clamp the housing at a predetermined position in a wellbore, and a hydraulic actuator capable of generating forces in excess of about 1000 newtons to provide a seismic wave which has a maximum frequency of between about 10Hz and 1500Hz.

USE/ADVANTAGE - Nondestructive hydraulic downhole seismic sources for use in obtaining information about underground formations penetrated by a wellbore, e.g. cross well tomography and reverse vertical seismic profiling. The downhole vibrator can generate seismic signals at the same frequency as that recorded from surface seismic sources. The downhole seismic source exhibits greater wave penetration than existing tools because of its higher power output capability.

Member(0002)
ABEQ US 4702343 A UPAB 20050425
Downhole seismic source comprises a reaction mass attached to the interior of a housing which is clamped in a wellbore. The mass can be moved hydraulically to generate a seismic wave of predetermined frequencies.
The hydraulic generator is pref. an actuator. . . max. frequency between 10 and 1500 Hz. (15pp)0 4783771 A UPAB 20050425
Information is obtd. from a function penetrated by a well bore by clamping a non-destru seismic source at different points in the bore and, at each position, hydraulically moving a reaction mass in the source to generate seismic wave. The waves are detected at a spaced location; pref. by geophones. (15pp)1

CASE # 10/695,078

Feb. 28, 1967 M. G. BAYS 3,306,391

PORTABLE SEISMIC TRANSDUCER

Filed March 16, 1964 4 Sheets-Sheet 2

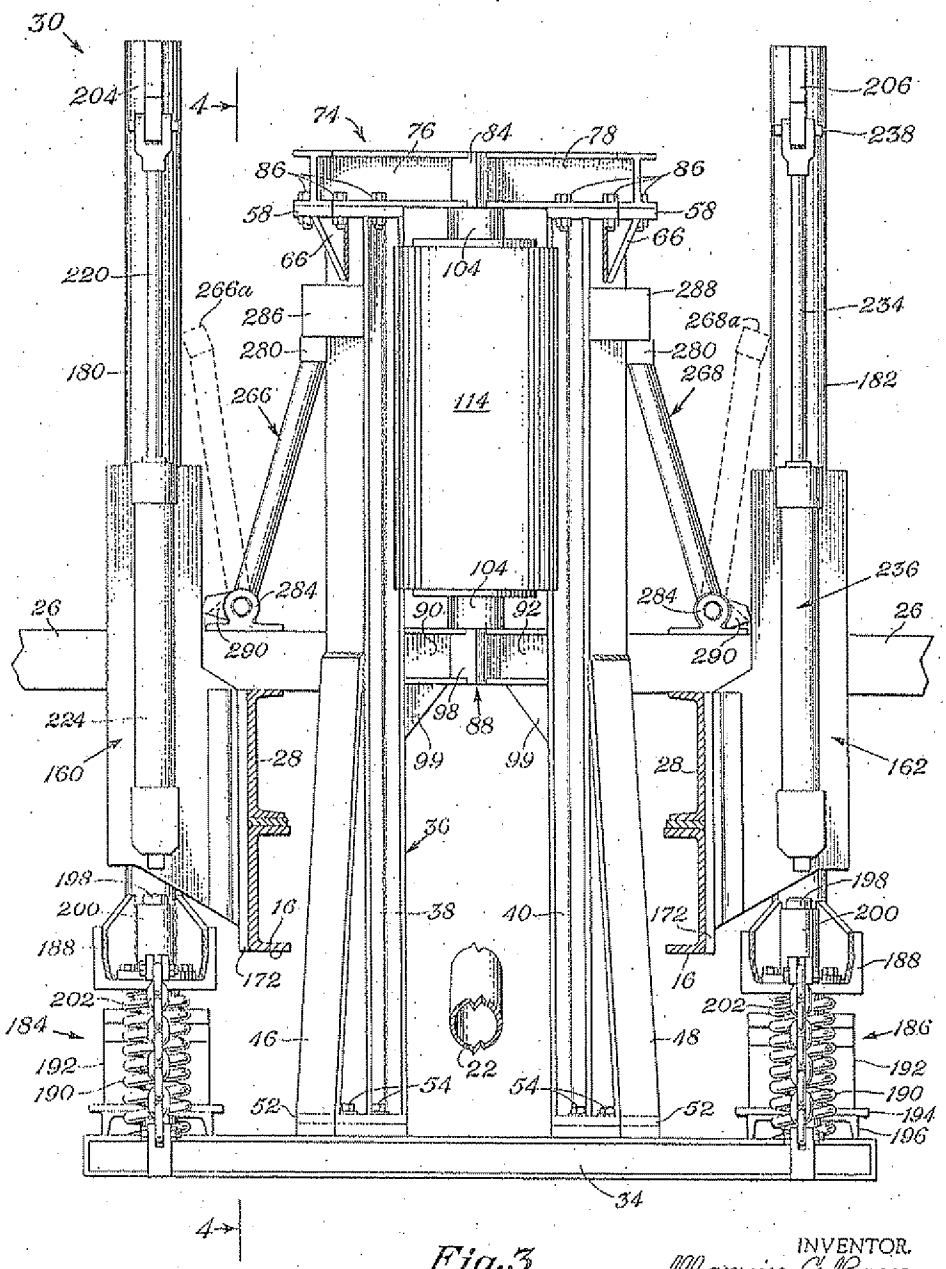


Fig. 3

INVENTOR.
Marvin G. Bays
BY William J. Mills
Attorney

CASE # 10/695,078

US-PAT-NO: 6392329
DOCUMENT-IDENTIFIER: US 6392329 B1
TITLE: Piezoelectric vibrating apparatus

DATE-ISSUED: May 21, 2002

US-CL-CURRENT: 310/328

APPL-NO: 09/417150
DATE FILED: October 12, 1999

Brief Summary Text - BSTX (19):

The present invention provides a vibrational motor and a method of mounting piezoelectric actuators or stacks of piezoelectric actuators on the vibrational motor. Specifically, the present invention provides a vibrational motor in which, relative to prior art devices, the weight and dissipative forces are minimized, load distribution is more uniform and mechanical mounting is more secure. In the preferred embodiment, THUNDER type piezoelectric actuators are attached at their edges to top and bottom mounting members, and this motor assembly is attached to the blade of a vibrational tool. This vibrating tool may advantageously be used to modify the texture or character (i.e. the "finish") of a surface of a work material or for other purposes. The vibratory action of the tool is generated by one or more piezoelectric actuators which, when energized, vibrate at the frequency of the applied voltage. The piezoelectric actuators are mounted in a **motor assembly that is attached to a reaction mass,** a blade/plate and a flexible membrane. In the preferred embodiment of the invention, the vibrations are transferred from the motor and attached mass through the blade and flexible membrane at the bottom of the tool and into plastic concrete work material. This vibration causes air and water to rise to the surface of the concrete creating a slurry, which is desirable for producing a smooth surface finish. The **motor assembly is sufficiently light that a reaction mass** may be attached to it to tune the amplitude and resultant force of the vibrations which are transferred to the blade of the vibrational tool. The reaction mass also ensures that the majority of vibrations are transferred in the appropriate direction, i.e., downward to the work surface. This, coupled with the lightweight design and other characteristics described hereinbelow, makes the tool very easy to handle and operate.

Detailed Description Text - DETX (16):

The design of the motor 1 in FIGS. 5-7 has greater simplicity than the designs of the prior art illustrated in FIGS. 1 and 2. There are fewer parts to the motor 1 and therefor less weight. The housing and the slotted side walls of the prior art are eliminated. Furthermore, the spring mechanism 6 of the prior art devices is eliminated. This is because vertical orientation of the actuators 100 allows the metal substrates 12 and 13 to fulfill the function of the spring 6 in prior devices. Elimination of the spring 6 also decreases the weight of the motor 1, and eliminates the need for the actuators 100 to overcome the opposition of a spring 6, which dissipates the achievable force of the motor 1. Furthermore, by taking the output motion of the actuator at the edges 11, the need for spacers 33 clamped at the center of the faces 100a and 100c of each of the horizontally mounted actuators 100 as in the prior art is eliminated. The spacers 33 also opposed the bending motion of the actuator 100, as **well** as added additional weight to the motor 1. The elimination of clamped spacers 33 thus reduces weight and the opposition of the spacers 33 that dissipate the achievable force of the motor 1. Reduction of the weight of the motor 1 makes it easier to tune (with attached masses) the amplitude of **vibrations** and hence the deliverable force of the motor 1. Reduction of the weight of the motor 1 also makes a lightweight device which is easier to for a user to operate. Reduction of the weight of the motor 1 also helps to

provide a lightweight device which is less likely to damage a plastic work surface such as fresh concrete.

Detailed Description Text - DETX (21):

The edges 11 of each actuator 100 are clamped into the top and base housing members 80 and 90 using the bolts 45 and a series of clamping blocks 43. The bolts 45 extend from the side 91 of the mounting member 80 and 90 through the aperture 49 in the side 91 of the housing member 80 and 90 and into the recess 81. The bolt 45 then extends alternatingly through a hole 42 in each clamping block 43 and the slot 14 in each actuator 100. The hole 42 in the **clamping** blocks 43 is larger than the width of the bolt 45, which allows the **clamping** blocks to rotate slightly with respect to the bolt 45, to accommodate the **angle** of the actuator edges 11 with respect to the bolt 45. After the bolt 45 passes through the last actuator's 100 slot 14, it is received in the threaded fastener 44. By tightening the bolt 44 against the side 91 of the housing member 80 and 90 and in the threaded fastener 44, the clamping blocks secure the actuator edges 11 in the recess 81 of the housing members 80 and 90. An additional clamping block 43 may be included on the bolt 45 between the last actuator 100 and the threaded fastener 44. Additionally, the first **clamping** block 43 may be eliminated by having an interior wall in the recess 81 in the housing member 80 and 90 which is **angled** to accommodate the **angle** of the edge 11 of the first actuator 100.

Detailed Description Text - DETX (25):

The **vibrational** finishing tool 3 further comprises a reaction mass 52. The reaction mass 52 is attached to the mounting member 40 or 50 that has no shaft 32 or plate 8 attached to it. The reaction mass 52 may be of any shape, but is preferably box shaped, as is further described below. The main function of the **reaction mass 52 is to direct the vibrations of the motor** 1 downward to the plate 8 (i.e., to make the top mounting member 40 relative stationary with respect to the reaction mass 54 and work surface 9). The reaction mass 52 may also function to tune the amplitude of the **vibrations** of the motor 1 as **well** as increase the amount of force transmitted by the motor 1. The structure of the reaction mass 52 may also be used as a platform on which to advantageously mount other elements of the **vibrating** tool 3. Preferably, the **reaction mass 52 is attached to the motor** 1 at the top mounting member 40 and encloses the motor 1. The box shaped reaction mass 52 extends across the top mounting member 40 and down around the sides of the motor 1 a sufficient distance to prevent the actuators 100 or the edges 53 of the plate 8 from contacting the **reaction mass 52 while the motor** 1 is **vibrating**.

Detailed Description Text - DETX (34):

In a modification of the present invention, two or more motors 1 or 2 constructed substantially as described herein above may be assembled together to compose a larger, multi-motor tool. In a multi-motor tool, several individual vibrating motors 1 (each constructed substantially in accordance with the preceding description of the preferred embodiment of the present invention) may be attached to a common reaction mass 52 and a common flexible membrane 55. Adjacent vibrating motors 1 may be secured to each other by fasteners (not shown) or similar fastening means. In the multi-motor vibrating tool 3, the handle 59 (which is used in the preferred embodiment of the invention) is attached to the common **reaction mass 52 and is used to pull the multi-motor** tool 3 across the work surface 9. Electrical power to the individual motors 1 may be provided by a common power supply 22 located inside of the elongated handle 59, inside of the center of the handle 59, on an operator-worn belt, or elsewhere. Alternatively, each individual motor 1 may be provided with its own individual power supply 22, as described above with respect to the preferred embodiment of the invention.

CASE # 10/695,078

US-PAT-NO: 4607980
DOCUMENT-IDENTIFIER: US 4607980 A
TITLE: Apparatus for compacting soil, concrete and like materials

DATE-ISSUED: August 26, 1986

US-CL-CURRENT: 404/133.05, 175/122 , 175/95

APPL-NO: 06/678991
DATE FILED: December 6, 1984

Brief Summary Text - BSTX (17):

A method of acting on media using vibration and impact parameters varying in time is the most universal and efficient. Its advantage as compared to any known modern methods of compaction of material resides in the possibility of fully taking into account physico-mechanical properties of a medium and the action of the system as a whole and of individual components as well as in the possibility of controlling the working process under operating conditions.

Detailed Description Text - DETX (7):

The cranks 8 and 9 are eccentrically installed on the shaft 10 and are phase shifted at an angle .phi., the crank 8 having a radius r.sub.1 and the crank 9 , a radius r.sub.2, the radii r.sub.1 and r.sub.2 being equal or different. The connecting rods 11 and 12 have lengths l.sub.1 and l.sub.2, and the hammer rams 13 and 14 have heights S.sub.1 and S.sub.2, the distance between the impact surfaces of the rams being "h".

Detailed Description Text - DETX (14):

When the reaction mass and the tamping shoe move relative to each other in the opposite directions, the elastic members 17 are compressed. After the hammer rams 13 and 14 pass through the upper dead center, the reaction mass 4 moves down under the action of gravity and forces of the elastic members 17. The hammers 5 and the mass 4 will blow at the anvils 18 of the tamping shoe 18, hence at the soil, Immediately after this impact action, the hammer rams will start moving away from each other again thus imparting a repulsion action, and the process is repeated. Therefore, the time of the vibration and impact action in this case is equal to one half of the period of rotation of the crankshaft 10.

Detailed Description Text - DETX (28):

A two-blow impact and vibration operation can be obtained at such frequencies .omega. of the vibration generator shaft at which, as a result of the impact interaction of the vibration generator with the tamping shoe, the jumps of the casing 7 becomes sufficient for the upper hammer ram 14 to cooperate with the anvil 6. The working cycle will then consist of the following movements in the impact cooperation of the vibration generator with the tamping shoe: the flight of the casing 1 away from the tamping shoe 1 toward the reaction mass 4, the impact interaction between the vibration generator and the reaction mass when the impact surfaces of the upper hammer 14 and the anvil 6 engage each other so that the reaction mass 4 starts moving in the guides in the direction away from the tamping shoe 1 to deform the elastic members 17. The casing 7 of the vibration generator starts moving toward the tamping shoe at a velocity equal to the difference between the velocity of movement of the hammer ram 14 relative to the casing 7 and the velocity of movement of the reaction

mass, then the free flight of the casing follows in the direction away from the reaction mass toward the tamping shoe after the separation of masses of the vibration generator and the reaction mass, and the subsequent impact interaction of the vibration generator with the tamping shoe through the hammer ram 13 and the anvil and the impact interaction of the reaction mass 4 with the tamping shoe 1 through the hammers 5 and anvils 18 as a result of this mass falling under gravity and forces of the elastic members from the height to which it has been raised upon the interaction with the vibration generator.

Claims Text - CLTX (6):

cranks fitted on a drive **shaft** and shifted in phase by a predetermined **angle** within said casing;

Claims Text - CLTX (11):

at least one third anvil adapted to take up the impacts of at least one upward moving hammer ram to **move vertically and mounted on the reaction mass**;

Claims Text - CLTX (13):

2. An apparatus as claimed in claim 1, wherein the number of hammer rams, cranks and connecting rods, respectively, is at least three, and at least one of the hammer rams being directed upward and cooperating with said at least one third anvil, a second and at least a third one of said hammer rams being directed downward and cooperating with said at least one first anvil, at least a third one of said cranks being mounted on the **shaft** at a phase shift relative to said cranks in the direction of **shaft** rotation by an **angle** which is smaller than said predetermined **angle**.

CASE # 10/695,078

DERWENT-ACC-NO: 1985-055439

DERWENT-WEEK: 198509

TITLE: linear actuator for **seismic** actuator has double-action piston reciprocated alternately w.r.t. reaction mass

INVENTOR: ROZYCKI M L

PRIORITY-DATA: 1982US-403888 (July 30, 1982)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
US 104801 H	November 6, 1984	EN

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	G01 V 1/155 20060101

ABSTRACTED-PUB-NO: US 104801 H

BASIC-ABSTRACT:

Linear actuator (10) includes a reaction mass (12) having an internal cylinder (14), and contg. a double acting piston (20) to which are attached upper and lower pistons (26) and (28). Hydraulic fluid under pressure is applied alternately to the upper and lower faces of piston (20) to reciprocate it in alternate strokes relative to the reaction mass. Rolling diaphragm seals (38) and (40), secured between piston **shafts** (26,28) and reaction mass (12), prevent external contamination from reaching laminar seals (30) and (32). **Shafts** (26) and (28) include enlarged portions (44) and (46) that are contactable with nests of conical springs (52) and (54), mounted at the top and bottom of **reaction mass (12), at the displacement** limits of piston **shafts**. The conical springs absorb energy and limit rebound between the reaction mass and the piston **shaft**. (Defensive)

CASE # 10/695,078

DERWENT-ACC-NO: 1984-061941

DERWENT-WEEK: 198410

TITLE: Excitation of seismic waves with emitting plate and reaction mass alternately excited and opposite phase seismic waves stimulated in ground

INVENTOR: ASAN-DZHAL A G; SHANINYAN A S ; TSIMMERMAN V V

PRIORITY-DATA: 1981SU-3357353 (November 23, 1981)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
SU 1018074 A	May 15, 1983	RU

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	G01 V 1/00 20060101

ABSTRACTED-PUB-NO: SU 1018074 A

BASIC-ABSTRACT:

Method is based on using a source of seismic signals containing a vibration exciter with a reaction mass and an emitting plate and has improved efficiency, achieved by firmly connecting the emitting plate to the ground, while the reaction mass is fastened to the surface of the ground.

During operation, electronic signal control unit (1) produces periodic controls signals, which pass to electro-hydraulic booster (3), which passes fluid, under pressure, alternately, to the upper and then to the lower cavities of hydraulic cylinder (2). The force action is applied, from one side through stem (5) to emitting plate (6)., exciting a seismic wave in the ground and, from the other side, to reaction mass (4) and, through junctions (7), into the surface of the ground. Seismic waves, of opposite phase, act on the ground and cancel each other out, at great distances from the source. When the emitting plate is contacting a lightly-absorbing substance, it has a great emitting capability, while the force on the surface is adjusted by the reaction mass. Bul.18/15.5.83.

CASE # 10/695,078

DERWENT-ACC-NO: 1987-277737

DERWENT-WEEK: 199207

TITLE: Downhole electromagnetic seismic source for cross borehole measurement and vertical seismic profiling

INVENTOR: PAULSSON B; PAULSSON B N P

PRIORITY-DATA: 1987US-008992 (January 30, 1987) , 1986US-841073 (March 18, 1986)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
WO 8705707 A	September 24, 1987	EN
AU 8772002 A	October 9, 1987	EN
US 4715470 A	December 29, 1987	EN
NO 8704608 A	December 21, 1987	NO
BR 8706212 A	February 23, 1988	PT
EP 263148 A	April 13, 1988	EN
US 4751688 A	June 14, 1988	EN
CN 87101970 A	October 7, 1987	ZH
JP 01500055 W	January 12, 1989	JA
EP 263148 B	August 7, 1991	EN
DE 3771983 G	September 12, 1991	DE
CA 1293556 C	December 24, 1991	EN

INT-CL-CURRENT:

TYPE	IPC DATE
CIPP	G01 V 1/143 20060101
CIPS	E21 B 23/01 20060101
CIPS	G01 V 1/06 20060101
CIPS	G01 V 1/155 20060101
CIPS	G01 V 1/38 20060101
CIPS	G01 V 1/40 20060101
CIPS	G01 V 11/00 20060101

ABSTRACTED-PUB-NO: WO 8705707 A

BASIC-ABSTRACT:

A downhole seismic source comprises a housing with a clamp for coupling the housing within a wellbore.

A linear electromagnetic actuator within the housing includes a cylindrical shell having an outer portion attached to the housing. An armature winding is attached to the inner portion of the shell and an inner core reaction mass is slidably positioned inside the armature winding.

The reaction mass is constructed from a magnetically active material and moves linearly along its longitudinal axis when the winding is energized.

CASE# 10/695,078

DERWENT-ACC-NO: 2004-037512

DERWENT-WEEK: 200563

TITLE: Drive assembly, for seismic land vibrator, has spring element that operates in at least two vibration modes in seismic frequency band of interest, baseplate, driver, and reaction mass

PRIORITY-DATA: 2002US-160230 (May 31, 2002)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
GB 2389184 A	December 3, 2003	EN
NO 200302273 A	December 1, 2003	NO
US 20030221901 A1	December 4, 2003	EN
US 6851511 B2	February 8, 2005	EN
GB 2389184 B	September 28, 2005	EN

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
GB 2389184A	N/A	2003GB-011188	May 15, 2003
US20030221901A1	N/A	2002US-160230	May 31, 2002
US 6851511B2	N/A	2002US-160230	May 31, 2002
NO 200302273A	N/A	2003NO-002273	May 20, 2003

INT-CL-CURRENT:

TYPE	IPC DATE
CIPS	G01 V 1/155 20060101

Basic Abstract Text - ABTX (1):

NOVELTY - Drive assembly for a seismic land vibrator (40) comprises at least a first spring element (1, 2) that operates in at least two vibration modes in a seismic frequency band of interest, a baseplate (8), a driver, and a reaction mass. The driver interacts with the reaction mass and the first spring element to transfer energy to the baseplate.

Basic Abstract Text - ABTX (6):

ADVANTAGE - The novel system provides a vibrator with increased efficiency, improved control over the frequency spectrum of the source, and matched impedance with the earth.

Title - TIX (1):

Drive assembly, for seismic land vibrator, has spring element that operates in at least two vibration modes in seismic frequency band of interest, baseplate, driver, and reaction mass

EPI Manual Codes - EMCD (1):

CASE # 10/695,078

US-PAT-NO: 4011923
DOCUMENT-IDENTIFIER: US 4011923 A
TITLE: Mobile seismic energy source

DATE-ISSUED: March 15, 1977

US-CL-CURRENT: 181/114, 181/119

APPL-NO: 05/611672
DATE FILED: September 9, 1975

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DT	2509704	March 6, 1975

Brief Summary Text - BSTX (2):

In modern seismic exploration, it has become common practice to employ a vibrator transducer to impart to the ground an oscillatory sweep-signal of predetermined characteristics. Generally the vibrator transducer includes a base plate in contact with the ground, a reaction mass having a weight of a ton or more, and a linear actuator designed to move the reaction mass reciprocatingly relative to the base plate in short vertical strokes. Working against the reaction mass, the base plate injects the desired vibrations into the ground.

Detailed Description Text - DETX (8):

Vibrator 12 is provided with a base plate 20 which when lowered into coupling contact with the ground, forms together therewith one of the two masses of a vibratory system. A second or reaction mass 22 is hydraulically coupled to the base plate. Mass 22 is a substantially cylindrical steel block in a central bore of which a double acting piston cylinder unit is mounted of which piston rod 24 is shown only, rod 24 being connected with the base plate 20 for coupling purpose. Reaction mass 22 is mounted between guiding rods 26 which interconnect base plate 20 and a cover plate 30 with which also the opposite or upper end of piston rod 24 is connected.

Detailed Description Text - DETX (14):

FIGS. 5 and 6 show, that base plate 20 of the inventive system may be applied also to ground surfaces which are inclined in the direction of the longitudinal axis of the vehicle. For adaptation of base plate 20 to surfaces which are inclined at right angles to the longitudinal axis of the vehicle, additional means may be provided.

21/5,K/7 (Item 3 from file: 987) Links
TULSA (Petroleum Abs)

0000690324 **Petroleum Abstract No:** 335742

SEISMIC TRANSDUCER BASE PLATE AND HOUSING ASSEMBLY

Author (Inventor): FAIR, D W
Patent Information: AUSTRAL 518,834, C 10/22/81, F 7/29/80, PR US 8/8/79 (APPL 7,900,590) (CONOCO INC); ABSTR, AUSTRALIAN OFFIC J PAT, PAT ABRIDGMENTS SUPPL V 51, NO 39, P 2688, 10/22/81 (ISSN 00049891) (AO)
Patent (Number Kind, Date): AU 518834 , 19811022
Application (Number, Date): AU, 19800729
Priority (Number, Date): US 7900590, 19790808
1981
Publication Year: 1981
Language: ENGLISH
Document Type: PATENT; P; ABSTRACT ONLY; AO
Record Type: ABSTRACT
A transducer apparatus for inducing **waves** in an **elastic** medium is described. It is comprised of a baseplate for engaging a surface of the elastic medium; a reaction mass having a cylinder **bore** extending therethrough and a double-rod-end piston, disposed in the **bore** so that the **reaction mass** is **driven** in reciprocation relative to the piston. A first rod end of the piston is rigidly connected to the baseplate. A second rod end of the piston is connected to the housing. The housing includes a frusto- conical section having a smaller diameter end rigidly connected to this second rod end and a larger diameter end rigidly connected to the baseplate. (Abstract only - original patent not available from T.U.)
Primary Descriptor: SEISMIC EQUIPMENT
Major Descriptors: BASEPLATE; EXPLORATION; GEOPHYSICAL EQUIPMENT; GEOPHYSICAL EXPLORATION; SEISMIC EXPLORATION; SEISMIC REFLECTION METHOD; SEISMIC WAVE PROPAGATION; SEISMIC WAVE SOURCE; SHEATHING; TRANSMISSION (SEISMIC); WAVE PHENOMENON; WAVE PROPAGATION; WAVE SOURCE
Minor Descriptors: (P) AUSTRALIA; CONNECTOR; CONOCO INC; COUPLING (MECHANICAL); DESIGN CRITERIA; ELASTICITY; ENGLISH; FITTING; GEOPHYSICS; GROUND COUPLING; INSTRUMENTATION; MECHANICAL PROPERTY; PATENT; PHYSICAL PROPERTY; PISTON; ROCK; SOIL (EARTH); SOLID; SPECIFICATION; SYSTEM (ASSEMBLAGE); TRANSDUCER; **VIBRATOR**
Subject Heading: GEOPHYSICS

32/5,K/2 (Item 2 from file: 987) **Links**
TULSA (Petroleum Abs)

0000788873 **Petroleum Abstract No:** 434291

TRANSPORTABLE HYDRAULIC SEISMIC TRANSDUCER

Author (Inventor): WEBER, R M
Patent Assignee: TEXAS INSTRUMENTS INC
Patent Information: **US 4,682,669**, C 7/28/87, F 2/18/86, PR US 2/10/83 (APPL 465,399) (8 PP; 4 CLAIMS)
Patent (Number Kind, Date): US 4682669 , 19870728
Application (Number, Date): US, 19860218
Priority (Number, Date): US 465399, 19830210
1987
Publication Year: 1987
Language: ENGLISH
Document Type: **PATENT**; P
Record Type: ABSTRACT
A transportable hydraulic seismic transducer has a seismic energy source connected to a pad for imparting elastic waves to the underlying ground. The energy source has a reaction mass with a single diameter cylinder formed therein, a double ended piston reciprocally mounted in the cylinder with a piston rod extending from opposite ends of the piston and a pair of bushings fitted within the cylinder at opposite ends to provide bearing surfaces for the opposite ends of the piston rod. A piston may be ringed and a liner fitted into place within the cylinder with the rings forming a seal with the liner. The piston may also be ringless and a liner made of a bushing material fitted within the cylinder so that between the piston and the liner, an adequate seal is provided. The use of the single diameter cylinder or bore permits the total machining of inserted parts such as the bushings and liners to be done before inserting in the reaction mass bore.
Primary Descriptor: SEISMIC WAVE SOURCE
Major Descriptors: EXPLORATION; GEOPHYSICAL EQUIPMENT; GEOPHYSICAL EXPLORATION; HYDRAULIC VIBRATOR; INSTRUMENTATION; SEISMIC EQUIPMENT; SEISMIC EXPLORATION; SEISMIC REFLECTION METHOD; SEISMIC WAVE PROPAGATION; SYSTEM (ASSEMBLAGE); TRANSMISSION (SEISMIC); VIBRATOR; WAVE PHENOMENON; WAVE PROPAGATION; WAVE SOURCE
Minor Descriptors: (P) USA; BASEPLATE; BUSHING; CHART; CONNECTOR; COUPLING (MECHANICAL); DATA ACQUISITION; DEFLECTION; DESIGN CRITERIA; ELASTIC **WAVE**; ENGINEERING DRAWING; ENGLISH; FIELD METHOD; FITTING; FLUID; FREQUENCY; GEOPHYSICS; GROUND COUPLING; HYDRAULIC SYSTEM; LIQUEFIED GAS; LIQUID; MAINTENANCE; PATENT; PISTON; PISTON RING; PISTON ROD; PRESSURE TRANSDUCER; RECORDING; REFLECTION (SEISMIC); REPAIR; SCATTERING; SEISMIC RECORDING; SEISMIC WAVE; SEISMIC WAVE SCATTERING; SPECIFICATION; TEXAS INSTRUMENTS INC; TRANSDUCER; TRANSPORTATION; VARIABLE FREQUENCY; VEHICLE; WAVE
Subject Heading: GEOPHYSICS
Minor Descriptors: (P) USA; BASEPLATE; BUSHING; CHART; CONNECTOR; COUPLING (MECHANICAL); DATA ACQUISITION; DEFLECTION; DESIGN CRITERIA; ELASTIC **WAVE**; ENGINEERING DRAWING; ENGLISH; FIELD METHOD; FITTING; FLUID; FREQUENCY; GEOPHYSICS; GROUND COUPLING; HYDRAULIC SYSTEM; LIQUEFIED GAS; LIQUID; MAINTENANCE; PATENT; PISTON; PISTON RING; PISTON ROD; PRESSURE TRANSDUCER...

32/5,K/1 (Item 1 from file: 987) **Links**
TULSA (Petroleum Abs)

0000917069 **Petroleum Abstract No:** 562487

DOWNHOLE ELECTRO-HYDRAULIC VERTICAL SHEAR WAVE SEISMIC SOURCE

Author (Inventor): COLE, J H
Patent Assignee: CONOCO INC
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1993
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Record Type: ABSTRACT
A down-**hole** electro-hydraulic vertical shear wave seismic source places the **reaction mass** internal to the source cylindrical housing and isolates the actuator from the **well-bore** fluid and pressure. The clamping system of this source uses 2 serrated **pads** radiused to match the inside diameter of the casing. Hydraulic cylinders which are retracted by internal compact stacks of spring washers are used for actuating the serrated **pads**. A device for keeping the **reaction mass** in a floating position with actuator piston centered within the actuator cylinder is provided by suspending the **reaction mass** from a compact and soft urethane spring. A threaded guide rod passing vertically through this spring allows spring compression to be adjusted until the actuator piston is precisely centered with no differential hydraulic pressure across the piston.
Primary Descriptor: DOWNHOLE SEISMIC SOURCE
Major Descriptors: CONNECTOR; COUPLING (MECHANICAL); FITTING; GROUND COUPLING; PROFILING; RECORDING; SEISMIC RECORDING; SEISMIC WAVE SOURCE; SHEAR WAVE SOURCE; VERTICAL SEISMIC PROFILING; WAVE SOURCE
Minor Descriptors: (P) USA; BODY (GEOMETRIC); **BOREHOLE**; CHART; CONOCO INC; CROSSHOLE METHOD; CYLINDER; **ELASTIC WAVE**; ELECTROHYDRAULIC SYSTEM; ENGINEERING DRAWING; ENGLISH; EXPLORATION; GEOMETRY; GEOPHYSICAL EXPLORATION; GEOPHYSICS; HYDRAULIC SYSTEM; HYDRAULIC **VIBRATOR**; MATHEMATICS; PATENT; PROCEDURE; SEISMIC EXPLORATION; SEISMIC REFLECTION METHOD; SEISMIC WAVE PROPAGATION; SHEAR WAVE; SV WAVE; SYSTEM (ASSEMBLAGE); TRANSMISSION (SEISMIC); **VIBRATOR**; WAVE; WAVE PHENOMENON; WAVE PROPAGATION
Subject Heading: GEOPHYSICS

L7 ANSWER 3 OF 6 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1988-346126 [48] WPIX
TI Hydraulic **vibrator** with wide dynamic range - has control which varies volume of central **chamber** in proportion to variations in reciprocal movement frequency
DC S03; X25
IN COLE J H
PA (CONO-C) CONOCO INC
CYC 1
PIA US 4785430 A 19881115 (198848)* EN 7[2]
ADT US 4785430 A US 1987-70762 19870707
PRAI US 1987-70762 19870707
AB US 4785430 A UPAB: 20060105
The **vibration** generator comprises a frame and a piston extending opposite two rod ends which are rigidly secured in the frame. A reaction mass has a cylinder **bore** hat is reciprocally disposed on the piston. A sleeve is secured between the first rod end and the **reaction mass** cylinder **bore**. A threaded **adjustable** sleeve is positioned between the second rod end and the reaction mass cyinder **bore** and is spaced from the first sleeve to define a cylinder space between them. A ring gear is affixed to rotate the adjustable sleeve.
A motor is energisable to drive the ring gear and adjustable sleeve in movement to vary the volume of the ylinoer spae. A shaft encode is driven by he ring gear to produce an output indiation of adjustable sleeve means position relative to the piston. A hydraulic device alternates fluid pressure in the cylinder **bore** on opposite sides of the piston. A control is responsive to the outpu indication of sleeve position to effect hydraui centering of the piston relative to the cylinder **bore**.
ADVANTAGE - Has wider bandwidth at higher frequencies.

STN 03/17/2009 Case# 10/695,078

L17 ANSWER 1 OF 1 WPIX COPYRIGHT 2009 THOMSON REUTERS on STN
AN 1981-C1604D [10] WPIX
TI Seismic transducer baseplate and housing assembly - provides in-phase force distribution over entire baseplate area engaging earth
DC S03
IN FAIR D W
PA (CONO-C) CONOCO INC; (FAIR-I) FAIR D W; (GEOP-N) GEOPHYSIQUE CIE GEN
CYC 32

PIA	WO 8100458	A	19810219 (198110)*	EN
	EP 24117	A	19810225 (198110)#	EN
	PT 71660	A	19810210 (198110)	PT
	FI 8002484	A	19810331 (198117)	FI
	EP 34145	A	19810826 (198136)#	EN
	DK 8005263	A	19810824 (198138)#	DA
	ZA 8004733	A	19810611 (198139)	EN
	DD 152636	A	19811202 (198219)#	DE
	HU 23764	T	19820928 (198241)#	HU

AB WO 1981000458 A UPAB: 20050420
The transducer is for inducing **waves** in an **elastic** medium. It has a baseplate for engaging the medium surface with a **reaction mass** having a cylindrical through **bore** in which a double-rod-end piston is positioned so that the **reaction mass** can in reciprocation relative to the piston. One end of the piston is rigidly connected to the baseplate whilst the other end is connected to the baseplate via a housing. This housing has a frusto-conical section with a smaller diameter end rigidly connected to the other rod end and a larger diameter end rigidly connected to the baseplate.
The housing also has a cylindrical section with one end rigidly connected to the baseplate and the other end connected to the larger diameter end of the frusto-conical section. This section has an angle of 40 deg. - 50 deg. with the longitudinal axis of the piston..
The seismic transducer has h.f. operation by having a lightweight baseplate and housing structure which is also as rigid as possible so that the dynamic force transmitted into the earth will be in phase over the entire baseplate contact area.

Member. . . .
Upper and lower skin plates (32 and 36) extend radially outward from the central hub (26). A plurality of equally **angularly** sapced reinforcing plates (40) also **extend** radially outward from the hub (26) and have their upper and lower edges rigidly connected to the upper and lower.. . .

Member. . .
piston rod (76). Upper and lower skin plates (32 and 36) extend radially outward from the central hub (26). A **plurality** of equally angularly spaced reinforcing **plates** (40) also extend radially outward from the hub (26) and have their upper and lower edges rigidly connected to the. . .